

## CLAIMS

1. A self-contained leak location device comprising a housing capable of travelling in a pipeline, the housing accommodating a hydrophone, a  
5 timer and a memory, where in the hydrophone and the timer are capable of generating an output and the memory is capable of recording the hydrophone output with reference to the timer output.
2. A leak location device according to claim 1 in which the housing  
10 comprises a resilient outer surface.
3. A leak location device according to claim 1 or claim 2 in which the housing is shaped and sized such that the device may be introduced into and retrieved from a pipeline through standard fittings.  
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4. A leak location device according to any preceding claim in which the housing is shaped and sized to travel with the flow of fluid through the pipeline.
- 20 5. A leak location device according to any preceding claim in which the housing is spherical.
6. A leak location device according to any of claims 1 to 4 in which the housing is an oval shape.  
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7. A leak location device according to claim 6 in which the device is arranged such that the centre of buoyancy and centre of gravity lie on its long axis.

8. A leak location device according to claim 7 in which the centre of buoyancy and the centre of gravity are separated from one another along the axis.
- .5 9. A leak location device according to any preceding claim which is arranged to record the hydrophone output and the timer output as the device passes through the pipeline.
- 10 10. A leak location device according to any preceding claim in which the device has substantially neutral buoyancy in the fluid passing through the pipeline.
- 15 11. A leak location device according to any preceding claim which is arranged such that in use it is be used to determine that there is a leak and locate the position of that leak.
12. A leak location device according to any preceding claim which comprises an electromagnetic transmitter.
- 20 13. A leak location device according to claim 12 in which the electromagnetic transmitter is a low frequency continuous detector-occasional transmitter (CDOT).
- 25 14. A leak location device according to claim 13 in which the CDOT is arranged to detect low frequency electromagnetic signals and provide an output to the memory of the time at which these were received.
- 30 15. A leak location device according to claim 14 in which the CDOT is arranged such that when a signal is received, the CDOT transmits a signal.

16. A leak location device according to claim 15 in which when a time passes since last detecting a signal that substantially exceeds a predetermined expected time, the CDOT periodically transmits an alarm signal.

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17. A method of determining the presence and location of leaks in a pipeline comprising:

- 10 i) inserting a self-contained leak location device capable of detecting and recording the occurrence of noise into the flow of fluid within the pipeline;
- ii) allowing the leak location device to travel through the pipeline with the fluid flow;
- iii) causing the leak location device to detect and record noise in the fluid; and
- 15 iv) causing the leak location device to record the time at which noise is detected.

18. A method according to claim 17 in which the method further comprises retrieving the leak location device from the pipeline downstream to its insertion point.

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19. A method according to claim 17 or 18 which includes the further step of downloading the recorded instances of noise along with the time at which they were detected onto a computing device.

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20. A method according to any of claims 17 to claim 19 which comprises recording the time at which the leak detection device is inserted into the pipeline and/or the time at which it is retrieved therefrom.

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21. A method according to any of claims 17 to 20 which comprises tracking the position of the leak detection device as it travels through the pipeline.
- 5 22. A method according to claim 21 in which tracking is achieved by causing the leak detection device to emit a signal periodically and/or continuously, on receipt of a signal.
- 10 23. A method according to any of claims 17 to 22 which comprises inserting the device into the pipeline and/or retrieving the device from the pipeline using a standard fitting.
- 15 24. A method according to any of claims 17 to 21 which comprises placing surface electromagnetic emitters and/or detectors at points along the pipe and causing the emitter/detector to emit a signal.
- 20 25. A method according to claim 24 which comprises causing the leak detection device to pass beneath a surface emitter, the leak detection device detecting a signal from the surface emitter and recording the time at which this occurs.
- 25 26. A method according to claim 24 or claim 25 which further comprises having detected the signal transmitted from the surface, causing the device to emit a signal that is detected by the surface emitter/receiver, causing the emitter/receiver to display the fact that the leak location device has reached that point.
- 30 27. A method according to any of claims 17 to 24 which comprises causing the leak location device to collect acoustical data, comparing the data to predetermined data indicative of a leak, detecting any match with

the predetermined data and displaying the presence of any leaks and their location along the pipeline that has been traversed.

28. A leak location system comprising a leak detection device arranged  
5 to collect acoustical data and at least one monitoring means wherein the or each monitoring means is capable of transmitting signals and the leak detection device is capable of receiving the transmitted signals.

29. A leak location system according to claim 28 in which the  
10 monitoring means provides a means to monitor the position of the leak detection device as it travels along the pipeline.

30. A leak location system according to claim 28 or claim 29 which is  
15 capable of transmitting signals and in which the monitoring means is capable of receiving signals.

31. A leak location system according to any of claims 28 to claim 30 in  
which the leak detection means comprises any of the features of claims 1  
to 17.

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32. A leak location system according to any of claims 28 to 31 which  
comprises a computing means arranged to process data collected by the  
leak detection device.

25 33. A leak location device system according to claim 32 in which the leak detection device and the computing means are arranged such that the data may be downloaded from the leak detection device onto the computing means.

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